**Modeling Climate Online Part 2**

*1.1.1 Outline the concept and characteristics of system*

*1.1.2 Apply the systems concept on a range of scales.*

*1.1.6 Define and explain the principles of positive feedback and negative feedback*

*1.1.8 Distinguish between flows and storages in relation to systems*

*1.1.9 Construct and analyze quantitative models involving flows and storages in a system*

*1.1.10 Evaluate the strengths and limitations of models*

*2.5.4 Describe and explain the transfer and transformation of materials as they cycle within an ecosystem*

*6.1.1 Describe the role of greenhouse gases in maintaining mean global temperature*

*6.1.2 Describe how human activities add to greenhouse gases*

**Go to the third Segment on** [**http://concord.org/activities/modeling-earths-climate**](http://concord.org/activities/modeling-earths-climate)

**Interactions within Earth’s Atmosphere**

1. Run the model of the Earth’s Atmosphere. Play with it until you understand how it works, then answer the following questions

a. What two things can happen when energy from the sun interacts with the ground?

b. How is CO2 shown in this model?

2. After adjusting the amount of CO2 in the air answer the following questions

a. Describe the effect of COc on global temperatures.

b. on the axis below draw this relationship.

c. What happens if you remove all of the CO2 from the atmosphere?

3. After watching the model of solar radiation hitting the ground, answer the following questions

a. What happens when the sunlight hits particles in the ground?

b. What happens when you increase the heat energy shading?

c. What happens to solar energy when sunlight hits the Earth?

d. What happens when infrared radiation hits the greenhouse gases>

e. How do CO2 and other greenhouse gases cause the Earth’s atmosphere to warm?

f. Explain the similarities between the molecular model and the Earth system model.

4. What are some causes of the CO2 increase over the past 50 years?

5. What is the source of the red “wiggles” in the CO2 plot, compared to the average values shown in black?

**Carbon Dioxide Cycling**

**Go to the fourth Segment on** [**http://concord.org/activities/modeling-earths-climate**](http://concord.org/activities/modeling-earths-climate)

1. Which statement is true about biogeochemical cycles?

2. Is there a reservoir in the Earth system that serves only as a sink for carbon dioxide? Explain your reasoning.

3. Create a hypothesis for what will happen with an increase of temperature on CO2 dissolving in the ocean.

4. Write a conclusion explaining how temperature impacts carbon dioxide dissolving in the ocean.

5. What happens to the carbon dioxide that sinks to the bottom of the ocean.

6. What is the relationship between atmospheric CO2 and its absorption by the ocean?

7. Draw a systems diagram of the carbon cycle.

**Water Vapor**

**Go to the fifth segment on** [**http://concord.org/activities/modeling-earths-climate**](http://concord.org/activities/modeling-earths-climate)

1. What is the relationship between water vapor and temperature?

2. When there is more water vapor in the atmosphere, what will happen to the temperature?

3. Which greenhouse raises the temperature faster? How can you tell?

4. The effect of two greenhouse gasses model

a. How does the level of carbon dioxide affect the level of water vapor in the atmosphere?

b. How does increasing CO2 impact water vapor? Explain

5. Sketch the positive feedback system that affects Earth’s climate.

**Models**

1. What are the benefits of using the models you have tried today?

2. What are the limitations of the models you have used today?